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FOREST AND RANGE EVALUATION PROGRAM

WORKER SAFETY IMPACTS ASSOCIATED WITH LEGISLATION, POLICY, PLANNING AND IMPLEMENTATION OF FOREST HARVESTING ACTIVITIES IN BRITISH COLUMBIA

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Sustainability of Forest and Range Resources Through Science and Stewardship

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Management of forest and range resources is a complex process that often involves the balancing of ecological, social, and economic considerations. This evaluation report represents one facet of this process. Based on monitoring data and analysis, the Timber resource value team offers the following recommendations to those who develop and implement forest and range management policy, plans, and practices.

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EXECUTIVE SUMMARY

In 2005, 43 fatalities and 110 serious injuries occurred in British Columbia's forests. In response, the Forests and Range Practices Advisory Committee requested that the Forest and Range Evaluation Program (FREP) investigate some of the reasons behind these deaths and injuries.

In fulfilling the request, this FREP evaluation project examined the planning and design of partial cutting, wildlife tree retention, and forest road building in British Columbia to:

- identify and evaluate the causes of any impacts on worker safety related to these activities;
- identify whether the *Forest and Range Practices Act* or other legislation mandates unsafe practices or restricts the ability to implement safe practices; and
- identify planning practices to eliminate or minimize the known safety-related impacts of these activities for potential inclusion in an Industry Recognized Practices (IRP) safety-planning handbook.

To meet these objectives, the project team conducted the following activities:

- an analysis of a WorkSafeBC database describing more than 12 000 forest-sector accidents with accepted injury claims from 2000 to 2005;
- the development of a safety survey that was delivered to 770 forest industry workers; and
- an analysis of relevant legislation and regulations pertaining to worker-identified safety issues.

The analysis of the WorkSafeBC database provided a snapshot of prevalent safety issues over a 6-year period. It showed, for instance, that fallers sustained the highest rate of serious injury (6.8%). The data also revealed a generally declining annual number of injuries, from 2704 accepted claims in 2000 to 1698 claims in 2005; however, the percentage of serious injuries reported over this period increased, particularly in the falling and transport categories.

The survey format was developed to elicit direct responses from two groups of forest industry workers ("planners" and "loggers") about their safety-related experiences. The survey obtained both statistically significant findings and valuable qualitative perspectives, which are often unattainable through strictly quantitative means.

The survey distribution achieved broad geographic coverage and canvassed a wide range of occupations, experience levels, and employer types. The email distribution to forest planners through the Association of BC Forest Professionals (ABCFP) yielded 509 respondents, a sample size estimated by BC Stats as accurate to within ± 4.4%. Forest operations workers completed 261 surveys, a sample size estimated by BC Stats as accurate to within ± 6.1%.

Survey responses identified many specific factors that commonly influence worker safety. Production pressures, fatigue, lack of training, and lack of experience were the factors most commonly cited as affecting worker safety. Environmental policies associated with the planning and design of partial cutting, wildlife tree retention, and road-building practices were considered a much lesser issue for worker safety. Survey participants' responses also revealed that little direct communication occurred between forest planners and operations workers. Almost all respondents felt that improved communications, and greater knowledge of the others' work, would greatly improve worker safety. In addition, survey participants contributed 80 specific suggestions when asked to identify practices to improve worker safety. With further refinement, these responses could form the basis of a "best practices" handbook.

Respondents' most frequently articulated environmental policy concerns involved a perceived lack of flexibility for workers to adjust block boundaries or leave unsafe areas unharvested, and the inability to achieve safety-related appraisal cost allowances. Ministry of Forests and Range (MFR) legislation and policy specialists were asked to review these concerns in relation to the current management requirements of the *Forest and Range Practices Act (FRPA)*. The analysis indicated that although *FRPA* does provide considerable flexibility to address safety issues, this flexibility is not always clearly understood or consistently applied. This apparent difference in observations between the survey respondents and the MFR policy specialists underscores the timing of survey administration during the transitional environment that surrounded implementation of *FRPA*. It is likely that some survey participants based question responses on their experiences with the previous Forest Practices Code (FPC) rather than on management under *FRPA*. The difference in observations does, however, highlight a need for enhanced communication of current policy to forest industry planners and workers, and government staff.

Several other important safety initiatives have either been completed or started, including several Coroners' Inquests, the Auditor General's Report on forest worker safety, and the MFR commitment to develop a comprehensive Action Plan

for Forest Worker Safety. In light of these safety-related initiatives, the findings of this evaluation report represent just one component of a large and complex process.

The following recommended activities draw on both the insightful contributions of the forest industry workers who responded to this project's safety surveys and the policy analysis included in this report:

- A training and communication program for planners, forest workers, and government staff to improve their understanding of legislative and regulatory requirements, and the human, engineering, and equipment limitations present during harvesting operations.
- Annual forums, such as peer-to-peer workshops, to involve government, professional bodies, and industry associations in the sharing and discussion of safety information.
- A review of the methods used to communicate cutting permit and appraisal policy and procedures to both licensees and government staff.
- Regular pre-harvest safety meetings between planners, supervisors, and loggers to provide opportunities for continuous improvement of practices.
- Co-operative development of "road use agreements" for licensees operating on shared roads or road networks to enhance safety by ensuring adequate road maintenance.

The Joint Practices Board should consider the following recommendations, which aim to aid the Association of BC Forest Professionals and the Association of Professional Engineers and Geoscientists of British Columbia in developing guidelines for forest roads:

- Describe professional responsibilities and accountabilities for the design, construction, safety standards, and maintenance of forest roads;
- Include a section on relevant policy that incorporates limitations and opportunities for flexibility; and
- Include the "best safety practice" recommendations identified by planners and loggers in the safety surveys.

Finally, to determine whether the province's safety record is improving, it is imperative that the forest sector, including industry, government agencies, WorkSafeBC, and the BC Forest Safety Council, work collaboratively in developing an information system that will clearly establish baseline safety data. This system will ensure that the appropriate information is gathered, evaluated, and freely shared in a timely manner to continually improve safety performance for everyone using British Columbia's forest resources.

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1.0 INTRODUCTION

1.1 *Background*

In 2005, 43 fatalities and 110 serious injuries occurred in British Columbia's forest industry. In 2006, 12 fatalities occurred. As of July 9, 2007, there had been 9 fatalities.

Of the 50 fatal claims accepted by WorkSafeBC in 2005,[1] 54% were registered in the forestry sub-sector category, 34% in the wood and paper products category, and 12% in the log-hauling category. Of the six deaths in the log-hauling category, four workers drove off roads, and logs or equipment crushed two others. In 2005, the 27 worker deaths in the forestry sub-sector category were related to the following causes:

- 6 in plane and helicopter crashes,
- 12 struck by logs, trees, or boulders,
- 6 crushed by equipment,
- 1 in a motor vehicle accident,
- 1 in a welding explosion, and
- 1 falling off equipment.

In response to the 2005 forest worker safety record, the Forests and Range Practices Advisory Council requested that the Forest and Range Evaluation Program (FREP) examine the impacts on worker safety of current forest practices associated with road building (planning, construction, and maintenance), partial cutting, and wildlife tree retention, and identify best practices to ensure worker safety.

The Western Fallers Association (WFA), in a report sponsored by the BC Forest Safety Council, suggested that selection falling contributes to worker injuries (Western Fallers Association 2005). One unsafe practice documented by this report is the felling of timber among trees rather than felling timber into open spaces. Furthermore, the BC Forest Safety Council and FREP identified that potential safety risks which may be introduced through the planning and design of forest operations were a knowledge gap requiring assessment. Forest professionals (Registered Professional Foresters and Registered Forest Technologists) generally undertake the planning of forest harvesting. This planning locates roads, cutblock boundaries, reserve and leave-tree retention areas, and defines harvest methods. Any of these planning and design practices may affect the safety of workers undertaking harvesting and log hauling operations.

1 Number of fatal claims varies from 43 because year of occurrence and year of claim acceptance may differ.

1.2 *Project Scope and Objectives*

For this FREP evaluation project, the project team focussed on the partial cutting harvesting practices currently recommended for ecological and visual concerns and whether the planning and design of these practices create potentially dangerous working conditions. The project was based on the following principles:

- Worker safety comes first.
- Partial cutting, wildlife tree retention, and road building are all critical components of forest management in British Columbia. The planning, design, and layout of forest harvest units and roads must ensure worker safety in subsequent operations.
- The perceptions and opinions of forest industry workers represent their "operational reality," which may lead workers to specific behaviours. Knowing, understanding, and acting on these opinions and perceptions are all important in developing specific and effective safety improvements.

The following three specific objectives guided the project's design, data analysis, and interpretation.

1. Identify and evaluate the causes of any impacts on worker safety related to the planning and design of partial cutting, wildlife tree retention, and forest road building in British Columbia.
2. Identify whether the *Forest and Range Practices Act* or other legislation negatively affects safety associated with the planning and design of partial cutting, wildlife tree retention, and road-building practices, either by mandating unsafe practices or by restricting a practitioner's ability to implement safe practices.
3. Identify planning practices to eliminate or minimize the identified impacts on forest worker safety for potential inclusion in an Industry Recognized Practices (IRP) safety-planning handbook.

To accomplish these objectives, the project team analyzed WorkSafeBC data that described over 12 000 forest sector accidents with accepted claims for compensation between 2000 and 2005. The team also travelled throughout the province to identify practices related to planning and design that could lead to unsafe harvesting operations. A safety survey was developed to gather quantitative and qualitative input from forest industry workers. This information represents the collective observations and opinions of 770 individuals. In addition, Ministry of Forests and Range policy specialists analyzed the safety-related issues raised by survey respondents in light of the relevant legislative and regulatory environment.

British Columbia's forest industry is in a state of transition from the previous Forest Practices Code (FPC) to the current *Forest and Range Practices Act* (*FRPA*). The new legislation considerably changes the forest management regime, with reliance on professional capability, competence, and accountability to ensure development and implementation of sound management plans. Although many survey responses were reflective of this transitional FPC to *FRPA* management environment, other responses appeared to reflect the situation that existed before the implementation of *FRPA*. Therefore, much of the information presented here should be considered as baseline data with which to compare the safety record under *FRPA* to that under the FPC.

Since this project began, a number of other important safety initiatives have either been completed or started, including several Coroners' Inquests and the Auditor General's Report on forest worker safety. The B.C. Ministry of Forests and Range has also announced a commitment to develop a comprehensive Action Plan for Forest Worker Safety. This action plan will require an analysis of all possible actions and options presented by the various safety initiatives.

In light of these safety-related initiatives, the findings of this evaluation report clearly represent just one component of a large and complex process. The insightful contributions of the 770 forest industry workers who participated in the safety surveys, along with the policy analysis included in this report, will provide valuable perspectives for other high-profile safety initiatives currently under way.

1.3 *Organization of the Report*

Section 2 outlines the methods used by the project team to analyze the WorkSafeBC database, design the safety survey format, sample survey participants, and conduct the policy analysis. The findings of this evaluation project are presented in sections 3–6. Section 3 summarizes the trends evident from the WorkSafeBC database analysis. This information illustrates the geographic locations, accident types, and company sizes involved in accident claims from 2000 to 2005, and the number of injuries sustained in different forestry sector occupations. Section 4 presents a demographic profile of the survey participants along with many of their categorical responses and comments to questions in the areas of: primary causes of injuries; responsibility for safety; level of communication; perceived influence of legislation and policy; and safety concerns and best practices. Section 5 examines the relevant legislative and regulatory perspectives in relation to the safety-related administration and environmental policy issues identified by survey respondents. Survey participants also identified practices that were either in use or should be used to improve safety in the design and layout of roads, cutblocks, and retention areas. Section 6 compiles a comprehensive list of 80 suggested "best practices." These could form the basis of an Industry Recognized Practices (IRP) safety-planning handbook, as well as future effectiveness evaluations. Section 7 highlights the project team's conclusions and offers six recommendations that draw on the responses of the forest industry workers who participated in the safety surveys, and the review of the relevant legislative and policy environment.

2.0 METHODS

A WorkSafeBC database was obtained that contained descriptions of accidents in the forest sector from 2000 to 2005 inclusive. The data described over 12 000 accidents with accepted claims for compensation during the 6-year period. Information about traffic accidents included injuries sustained on public roads in addition to accidents on forest roads. These data were analyzed to discover any trends based on geographic location, accident type, or company size, and were summarized in several ways to illustrate the number of injuries experienced in different categories of occupations.

To gather a more complete understanding of forest safety issues, the project team travelled throughout the province to meet local forestry workers. In preparation for the field portion of the evaluation, a standard set of structured interview questions was developed in consultation with the BC Forest Safety Council, the Association of BC Forest Professionals, BC Stats, and a forest safety specialist.

In July 2006, attendees at the Prince George Forest Expo were invited to respond to a draft of the forest worker survey or to provide comments on its content. Eighty-two respondents were interviewed at the Forest Expo, and many suggested ways to improve the survey form.

Pre-tests showed that several questions measured essentially the same issues. Therefore, some earlier versions of questions were combined and some were discarded. Two survey forms evolved through this process: one survey for forest planners and the other for forest operations workers (fallers, yarding and loading crews, and logging truck drivers; see Appendix 1 and 2 for the survey forms).

Western Forest Products log truck drivers and BC Timber Sales planners in Campbell River then subjected the refined survey to a further review. Minor revisions were incorporated and the resulting survey forms were considered complete.

The survey for forest planners was copied to an online form developed by InSite Survey Systems Ltd. The Association of BC Forest Professionals (ABCFP) sent an email to its membership (received by 3200 members) inviting them to complete the survey. This solicitation resulted in 509 respondents. This sample size was estimated by BC Stats as accurate to within ± 4.4%. If 80% of ABCFP members held similar views, then the results would be considered accurate to within ± 3.5%.

The survey for forest operations workers was delivered in two ways. Recognizing that many log truck operators work independently, mill scales and log sort yards were visited at approximately 30 randomly selected sites distributed in six regional areas: Vancouver Island; southern Interior; central Interior; northern Interior; north/central Coast; and the south Coast. At these sites, log truck drivers were invited to complete a paper survey while their log load was weighed and unloaded. Some truckers were too busy to fill out the form on the spot, but took a copy, promising to complete it later and mail it in. In some cases, the survey administrator travelled through the log yard with the truck driver to complete the survey. In total, 140 trucker surveys were successfully completed and received using this method.

Loggers were approached in a different way. WorkSafeBC, via BC Stats, provided a list of 5600 logging contractors, which contained contact information and an indication of company size and location in the province. Companies were randomly selected within several strata to ensure distribution among the three forest regions (Northern Interior, Southern Interior, and Coast), and three company size classes. The randomly chosen companies were then telephoned, informed about the survey, and invited to participate. Of the 200 companies contacted, the project team was able to secure participation from approximately 30. The company contact person was then mailed a package of survey forms. Approximately 1600 surveys were distributed by mail and 121 were completed and returned. Overall, a target of 250 completed surveys was set for forest operations workers. The survey delivery to both truckers and loggers yielded 261 respondents. This sample size was estimated by BC Stats as accurate to within ± 6.1%. If 80% of forest operations workers in the province held similar views, then the results would be considered accurate to within ± 4.8%.

In addition to the categorical responses selected on the surveys, the qualitative responses were especially useful in identifying perceived safety issues related to the planning, design, and layout of forest harvest units and roads. Ministry of Forests and Range policy specialists evaluated these safety-related issues in light of the relevant legislation and regulations. Respondent comments were also grouped into a number of theme areas for the potential development of an "industry recognized practices" planning handbook.

3.0 WorkSafeBC Database Analysis

To help guide the development of this evaluation project and provide context for the development and interpretation of the resulting forest worker and planner surveys and policy analysis, the project team analyzed a database obtained from WorkSafeBC (WSBC). This database contained information about 12 030 accepted injury claims registered between 2000 and 2005 (inclusive).[2] The data described injury location by WSBC region, the nature of the injury, and the injured worker's occupation. The database did not contain personal information identifying individuals or employers, or information on the total number of workers by forestry phase or occupation, by geographic location (Coast versus Interior), or by company size. Therefore, accident "rates" for these categories could not be calculated.

3.1 *Injuries by Forestry Phase*

Forestry phases are aggregations of occupational classification units used to summarize WSBC data. Table 1 presents a summary of accident statistics by forestry phase.

Table 1. *Accepted injury claims by forestry phase, 2000–2005*

Forestry phase[a]	Total injuries	Serious injuries[b]	Percent serious (%)
Road construction	188	12	6.4
Falling	1801	122	6.8
Yarding	1091	64	5.9
Transportation	1945	86	4.4
Silviculture	2121	40	1.9
Fire Suppression	76	1	1.3
Integrated Forest Management	4808	220	4.6
Total:	12,030	545	
Average:			4.5%

a In this table: "falling" includes both manual and mechanized methods, as well as shake block cutting; "yarding" includes cable, ground skidding, and helicopter logging; "transportation" includes trucking, dryland sort, and marine operations; "fire suppression" includes firefighting contractors, but does not include Forest Service firefighters or conscripted, emergency firefighters; "silviculture" includes planting, spacing, and brushing contractors; and "integrated forest management" is a WorkSafeBC classification for companies that harvest in two or more stages.

b Serious injuries are defined as those that result in claims over $30 000, including skull fractures, amputation, and other injuries.

Falling, and log truck driving that occurs on public and forest roads, both have a high numbers of injuries, and a high rate of serious injuries. In addition, fallers clearing rights of way sustain approximately one-half of injuries in the road construction phase.

3.2 *Injuries by Forestry Occupation*

Table 2 lists the forestry occupations with the highest number of injuries.

Table 2. *Forestry occupations with 100 or more injuries, 2000–2005*

No. of injuries	Worker occupation[a]
1621	Faller; feller – logging
1015	Logging truck driver
988	Tree planter – forestry
553	Logging and forestry labourers
491	Cable hooker – logging (not heli-logging) log hooker
458	Bucker – logging
324	Deck crew – water transport
294	Heavy-duty equipment mechanics: locomotive
272	Slasher; brusher; brush cutter; swamper; cat swamper
269	Logging loader operator
261	Logging machinery operators: delimber operator; steelspar operator
248	Chokerman/woman – logging
235	Mine owner/operator; logging owner/operator
229	Skidder operator; grapple skidder operator
196	Silviculture and forestry workers: silviculture
187	Chaser – logging
178	Truck drivers: transport; long haul; long distance (public roads and forest roads)
157	Owner/operator – trucking
153	Boomman – logging
111	Bolt/shake cutter – logging
100	Heli-hooker; hooktender in heli-logging
100	Tree spacer; spacing saw operator; clearing saw operator; thinning

a WorkSafeBC occupation description.

2 For more information on forestry accident statistics see the WorkSafeBC Web site: http://www2.worksafebc.com/Portals/Forestry/Statistics.asp

3.3 *Injuries by Geographic Location*

The WSBC data indicated that, per cubic metre of wood harvested, the Coast had approximately three times the number of injuries compared to the Interior. Being struck by a falling, flying, rolling, or swinging object (usually a log) resulted in the most serious injuries. Collision of vehicles moving in opposite directions also often resulted in serious injuries both to workers on the Coast and in the Interior.

3.4 *Injuries by Company Size*

The size of the forest sector company that employs workers appeared to be correlated with injury frequency. WSBC data showed that workers employed by smaller companies had more reported injuries. From 2000 to 2005, workers employed by smaller companies also reported injuries that were more serious. The WSBC database did not contain information about the total population of workers by company size class or identify higher risk job functions by size class. Without this data, definitive conclusions concerning class size were not possible.

Table 3. *Injuries by company size, 2000–2005*

No. of employees	Total injuries	Serious injuries[a]	Percent serious(%)
< 5	3072	205	6.7
5–19	2706	118	4.4
20–99	2958	86	2.9
100+	1232	43	3.5
Not available	2062	93	2.3
Total:	12,030	545	
Average:			4.5%

a Serious injuries are defined as those that result in claims over $30 000, including skull fractures, amputation, and other injuries.

3.5 *Injuries over Time*

Figure 1 illustrates a declining rate of injury from 2000 to 2003, most notable in the Silviculture and Integrated Forest Management forestry phases; however, this trend appears to lessen from 2003 to 2005. Total accepted claims for injuries declined from 2704 claims in 2000 to 1698 claims in 2005, although the percentage of serious injuries increased over the 6 years, particularly in the falling and transport categories.

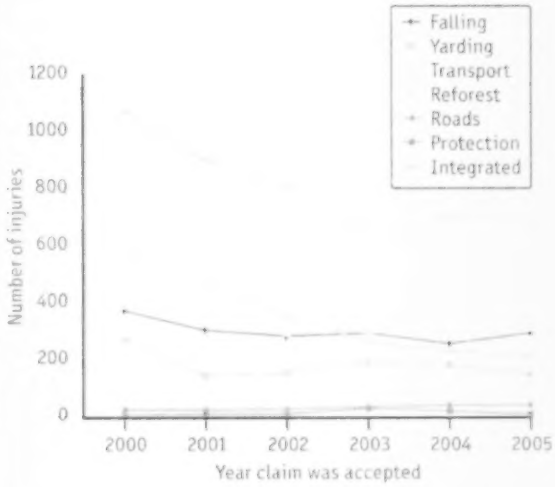


Figure 1. *Forest worker injuries by forestry phase and year, 2000–2005.*

4.0 SURVEY RESULTS

During the fall of 2006, the project team undertook an extensive survey of British Columbia forest industry workers using the safety surveys described in the Methods section (see survey forms in Appendix 1 and 2). Respondents included:

- forest professionals who design the location of roads, cutblocks, and wildlife tree patches;
- truck drivers who haul logs to mills;
- crews who fall, yard, and load logs; and
- supervisors, managers, policy-makers, and safety officers.

For forest professionals (hereafter referred to as "planners"), the team delivered the surveys digitally over the Internet. For forest operations workers (hereafter referred to as "loggers"), the team personally interviewed log truck drivers and mailed paper surveys to others in "logger" occupations. The survey distribution achieved broad geographic coverage and canvassed a wide range of occupations, experience levels, and employer types. A total of 770 forest industry workers responded to the survey: 509 planners and 261 loggers. This section presents a description of the resulting respondent profile and summarizes categorical responses and comments for survey questions related to:

- Primary causes of injury
- Responsibility for safety
- Level of communication
- Perceived influence of legislation and policy
- Safety concerns and best practices

4.1 *Profile of Respondents*

4.1.1 Occupations

Figure 2 shows a breakdown of the relative proportion of respondents by occupational category. In the logger category, a larger proportion (52% of sample) of truck drivers responded, reflecting the visits made by the team to log sorts and weigh scales, compared to a lower return rate by logging contractors to the mailed-out survey. The results show a relatively low response (i.e., 9%) from workers who can be readily identified as using hand-held equipment (e.g., fallers, cruisers, riggers, and scalers), although some of these occupations are also included under the "contractor" category, which accounted for a further 7% of respondents.

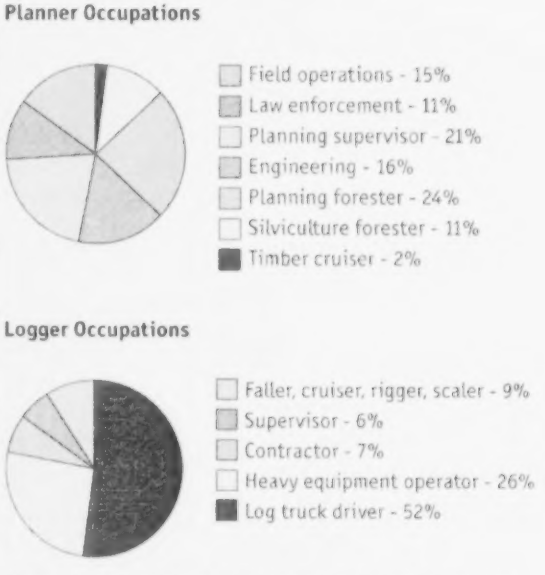
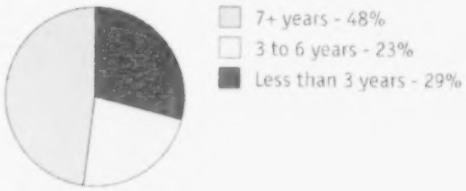


Figure 2. *Occupational categories of planners and loggers.*

4.1.2 Years of Experience

Survey participants were asked how many years they had worked in the forest industry, and how long they had worked in their current positions. Logger respondents generally had more experience than the planners who responded. For example, 61% of loggers had 7 or more years experience versus 48% of planners with this amount of experience. Figure 3 shows a breakdown of the relative proportions of planner and logger survey respondents by years of experience in their current positions.

Planner years of experience in current position



Logger years of experience in current position

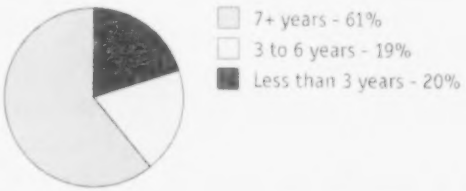
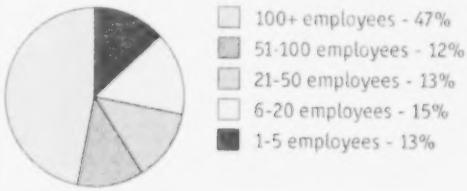


Figure 3. *Survey respondents' years of experience in current positions.*

4.1.3 Size of Employer

Figure 4 shows a breakdown of the company size of the planners' and loggers' employers. Although the profile shows a range of company sizes, 47% of the planners who responded worked for large companies (i.e., 100+ employees) or government, and 45% of loggers who responded worked for smaller companies (i.e., 20 employees or less).

Planner size of employment organization



Logger size of employment organization

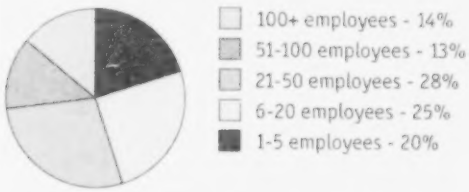
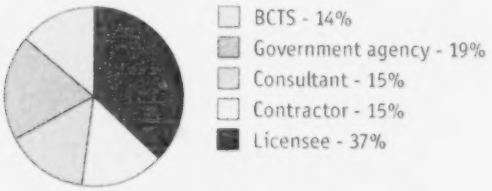


Figure 4. *Sizes of respondents' employment organizations.*

4.1.4 Type of Employer

Figure 5 shows a breakdown of the planners' and loggers' type of employer. Seventy percent of the planners surveyed worked for licensees or government, whereas 84% of loggers worked for contractors or were self-employed.

Planner employer type



Logger employer type

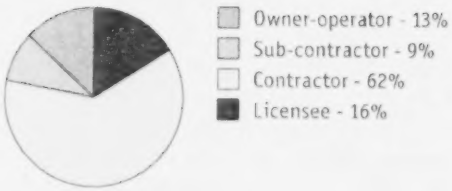
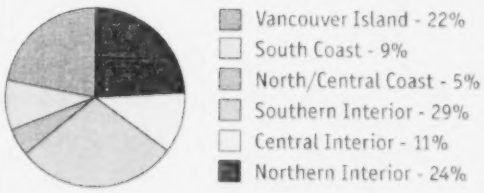


Figure 5. *Types of employers.*

4.1.5 Employment Location

Figure 6 shows a breakdown of the planners' and loggers' work locations. The survey responses showed a broad geographic distribution. The distribution of work locations was roughly similar between planners and loggers, except that more loggers worked in the central versus the southern interior of the province.

Planner work location



Logger work location

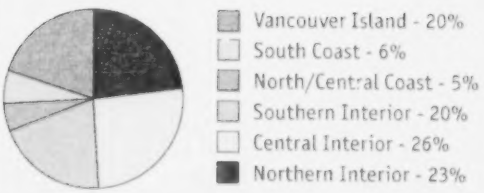


Figure 6. *Survey respondents' work locations.*

4.2 *Primary Causes of Injury*

Both planners and loggers were asked to select those factors that they considered most negatively affected forest worker safety. The survey form provided seven factors with check boxes plus an "other" category and requested respondents to select up to three boxes based on importance. Fifty percent of responses in the "other" category were about "attitude." Figure 7 illustrates that planners and loggers agreed on four primary causes of accidents and injuries—production pressures, fatigue, lack of training, and lack of experience.

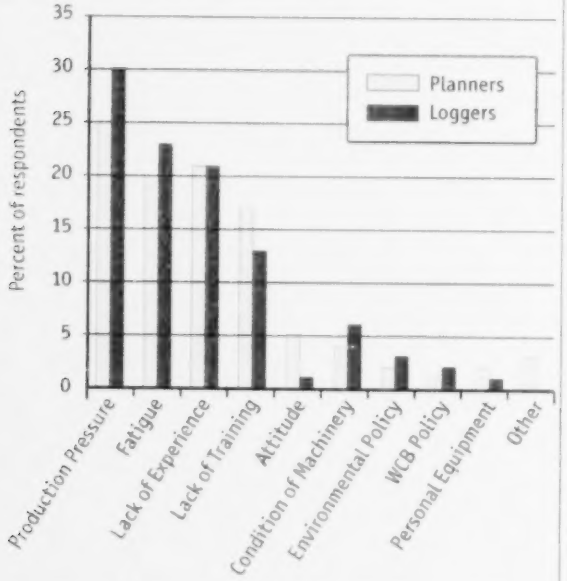


Figure 7. *Survey respondents' ranking of the factors perceived to negatively affect worker safety.*

Planners and loggers were asked to comment with specific details about what most negatively affects worker safety. The following summarizes their replies.

4.2.1 Production Pressure: Productivity

In this category, both planners and loggers commented that harvesting is occurring in increasingly difficult terrain, although workers are also expected to produce as much per day as in the past. Both planners and loggers stated that contractors must work faster during longer days to meet costs and make equipment payments. Maintenance (non-billable time) was often minimized. Due to seasonal weather influences, quarterly stumpage changes, and short-term lumber market conditions, harvesting was compressed into short periods of work, often at "panic speeds." For example, planners made the following comments: "The general unprofitable state of the forest sector is forcing economic constraints into all areas of operations including woodlands operations." ". . . anaemic earnings either spur employers to gain efficiencies that work in the regulatory realm or force them to work harder and harder with diminishing returns." ". . . people or companies that are making less and less money are going to devote more energy to figure out how to be more profitable rather than focussing on balance in their operations."

4.2.2 Production Pressure: Fatigue

Both planners and loggers identified that "panic speed" harvesting was accompanied by long workdays, whether for layout, yarding, or trucking crews. Fifteen-hour days, six days a week was a common schedule for truck drivers. Many log truck drivers perceived that they were exempt from the hours of work legislation that applies to highway truckers.

4.2.3 Knowledge: Training

Planners were asked what level of training they had received on safety considerations in their designs ("limited," "moderate," or "comprehensive"). Figure 8 illustrates their responses: 49% indicated that they had "limited" training in considering safety in their designs, 34% selected "moderate," and 17% selected "comprehensive." This question did not quantify "hours of training"; respondents were able to indicate their level of training in a qualitative description. Planners indicated that the best way to understand workers' needs and get feedback on the blocks and roads they designed would be to spend time with trucking and yarding crews in the woods, both before and after operations. When loggers and truckers were asked whether they thought planners and layout crews understood their operational requirements, two-thirds responded "never" or "occasionally."

Figure 8. *Level of training about design safety received by planners.*

Planners also identified that the accelerated harvest rates currently occurring in some parts of the province in response to the mountain pine beetle infestation required more harvest planners. In addition, planners thought that training was more important than ever given the imminent retirement of many of their peers.

Loggers mentioned high worker turnover rates due to working conditions and non-competitive wages. They also pointed out that machinery was increasingly high-tech and required more training to operate. A commonly noted barrier to training by individual initiative was the high cost. For example, respondents mentioned that it cost $9500 to become faller-certified (not including the cost of saws and wedges) and $10 000 to obtain the Class 1 licence required to drive a logging truck. Respondents indicated that no government training subsidies were available for these trades, and that contractors were often unwilling to pay for training because of cost and production pressures.

4.2.4 Knowledge: Experience

Planners were asked how much experience they had in their current positions. Over 50% had less than 7 years' experience, and 29% of respondents had less than 3 years' experience. Respondents mentioned that young planners spent too much time in the office, and that layout crews should spend time working with harvesting and road construction crews. Mentoring was commonly noted as one of the best ways to accelerate the accumulation of experience.

Loggers were asked the same question about experience levels. Twenty percent of the loggers surveyed had less than 3 years' experience, and over 25% reported more than 20 years in their current job. Loggers commented that planners needed more "on the ground" experience. They also thought that people with little experience in the woods were often the ones making the rules.

4.2.5 Attitude: "Strong and Tough"

Planners observed that it was part of forest worker culture to ignore safety in the woods. Alcohol and drug use were mentioned in both the written survey and during interviews with loggers. The planners commented that supervision and discipline were required, and that a lack of accountability for safety occurred up the chain of command. They suggested that although senior management says safety is the top priority, there is a tendency to "risk manage" safety to reduce costs.

4.2.6 Attitude: Complacency

Some planners commented that experienced workers get complacent after a long period with no incidents, and lose focus about the risks of the job. They noted that a culture of "assumed risk" (i.e., that risk of injury goes with the job) existed. Planners suggested that although employers may provide safety programs, the ultimate responsibility lies with the worker.

4.3 Responsibility for Safety

Both planners and loggers were asked who they thought was responsible for safety. Nine choices were provided ("government," "logging supervisor," "WCB," "licensee management," "contractor," "union," "planner," "worker," and "other"), although no responses were received in the "other" category. Participants were also asked to rate responsibility for safety on a scale from 0 ("not responsible") to 5 ("highly responsible"). Figure 9 illustrates the responses to this question. Total points for each category were summed and expressed as percentages. Both groups believed that workers are most responsible for their own safety. Logging contractors and supervisors were also thought to have significant responsibility.

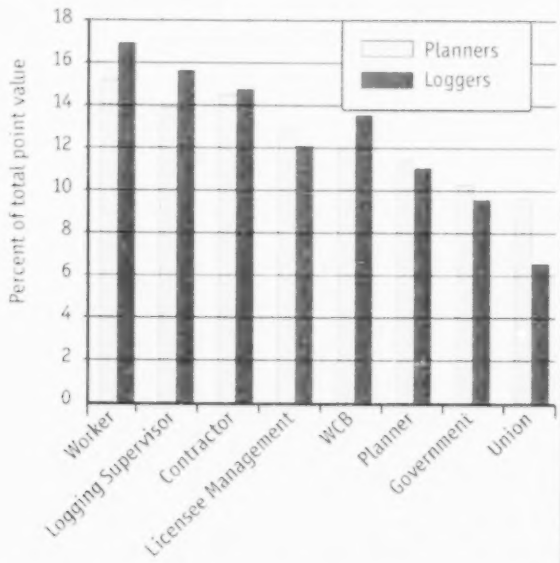


Figure 9. *Perceptions of responsibility for workplace safety.*

4.4 *Level of Communication*

Both planners and loggers were asked two specific questions about their level of communications with the other parties during pre-harvest work reviews and safety discussions. Their responses are outlined below.

4.4.1 Pre-Harvest Meetings

Planners were asked: "Are pre-harvest work reviews done with harvesting crews?" Loggers were asked: "Have you ever had a pre-job meeting with planners?" Responses to these questions are illustrated in Figure 10.

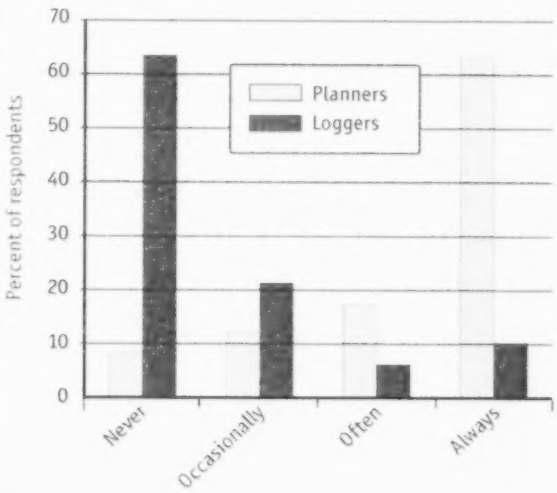


Figure 10. *Perceived frequency of pre-work meetings.*

Over 60% of the planners responded "always" and over 60% of loggers responded "never." This discrepancy may reflect the fact that loggers often talk to the logging supervisor, and not directly with planners.

Planners responded with the following comments in relation to this question.

- Only with our supervisor normally.
- Supervisor then talks to logging crews.
- May be third hand by the time the message gets to the loggers.
- Truckers are rarely, if ever, invited.
- There is significant distrust of pre-work meetings.
- Need pre-work sign-off, but needs to mean more than a reduction of formal liability.
- Both pre- and post-harvest reviews are recommended.

- If block conditions change significantly, may need to update safety pre-work.
- Should be field-based, not an office meeting.
- Include new workers.
- Get logging crew members involved in layout review before finalizing.
- Give the crew proper maps and teach them how to read them.

Loggers mentioned that the reason for the communications gap was that little or no direct contact occurred between planners and operations workers.[3] Contact was second or third hand, often passing through supervisors on both sides. Truckers were not part of the communications loop, and were rarely consulted about road layout, construction, or maintenance.

Loggers commented that their pre-work meetings were generally with their supervisors, not with planners. The supervisors often conveyed information received from the licensee's planner. The meetings addressed site-specific concerns, such as hazards on site, slope stability, traffic and parking, timber conditions, the location of the emergency transportation vehicle and first aid, and radio protocol.

Survey respondents indicated that some companies had site-specific meetings before starting work on each harvest block. Other companies reportedly had safety meetings only once or twice per year that mainly discussed overview issues, such as company safety policy, the job safety handbook on standard operating procedures, and personal safety equipment (hard hats and high-visibility vests). Respondents indicated that this communication is often augmented with Environmental Management System training.

Survey respondents indicated that a significant amount of layout work was carried out by independent contractors rather than directly by licensees, which they thought led to a larger break in the chain of communication.

3 Safety experts who reviewed a draft of this report discussed the responsibilities of "Prime Contractors" versus "Owners" of the work, and the difference between "Workers" and "Independent Operators," who are neither "employers" nor "workers" under the Worker's Compensation Act. Survey respondents did not raise these technicalities, and instead focussed on concerns about the work environment.

4.4.2 Safety Discussions

Planners were asked: "Do you hear from harvesting crews and truckers about their safety concerns?"; loggers were asked: "Have you ever talked with planners about safety?" Responses to these questions are illustrated in Figure 11.

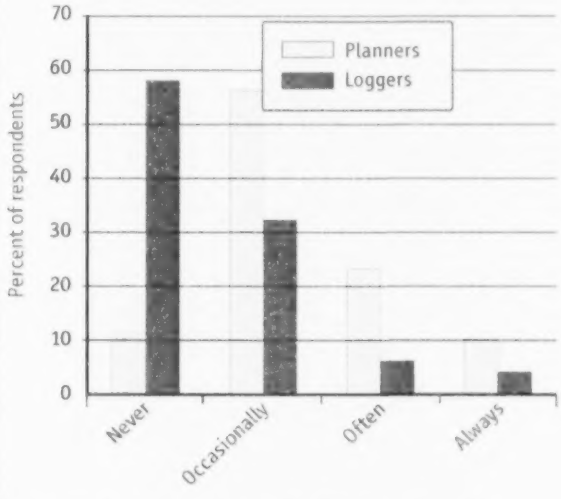


Figure 11. *Perceived frequency of safety issue discussions.*

This figure highlights a higher level of consensus between the two groups: both agree that safety issues are discussed "never" or "occasionally," and seldom are they discussed "often" or "always."

Both planners and loggers were asked how and where they met, and what topics were discussed. Planners commented that they received feedback at company meetings, conventions, and informally at get-togethers. They heard comments over the radio, and occasionally at site meetings. They heard from the safety committee, usually in the office, and occasionally at tailgate meetings before harvest operations began. Planners said that topics up for discussion at these meetings included poor maintenance, brushing roadsides, mileage markings, narrow roads, cycle times, logs sliding down hill, steep grades, and unrealistic falling situations.

Loggers commented that they seldom talked to planners during the block and road layout planning stages. Blocks were planned and approved before the loggers saw them. Loggers could, however, provide feedback via their supervisor when they saw that a design was hazardous. They said that feedback usually did not result in changes. Issues that loggers wanted to discuss with planners included: the

widths of switchbacks; road maintenance; roads being too steep and muddy, and in need of surfacing; and cycle time speed issues.

4.5 *Perceived Influence of Legislation and Policy*

Planners and loggers were asked whether they believed government legislation or policy contributed to unsafe work conditions. Figure 12 illustrates their responses. Approximately 25% of each respondent group said "yes."

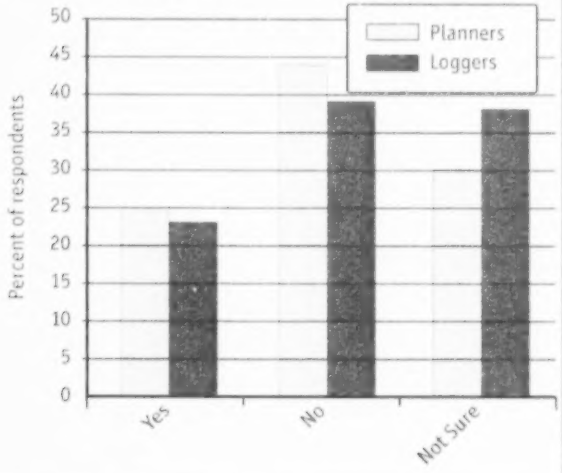


Figure 12. *Perceptions about whether government legislation and policies contributes to unsafe work conditions.*

Respondents who answered "yes" to the initial question identified two categories of issues: (1) administration and (2) environmental protection. Section 5 ("Safety Issues and Perspectives on Legislation and Policy") presents details of these survey results in relation to the analysis of the current management perspective undertaken by MFR policy specialists.

4.6 *Safety Concerns and Best Practices*

In both the planner and logger surveys, the project team asked participants to identify the practices that were either in use or should be used to improve safety. Loggers were asked: "Can cutblock, road design or layout changes reduce safety hazards?" Figure 13 illustrates their overwhelmingly affirmative response: 70% said "often" or "always." Planners were asked: "Have you reduced or eliminated specific safety risks through planning and design?" Over 75% of respondents said "yes" (Figure 14).

Figure 13. *Loggers' responses regarding whether design changes improve safety.*

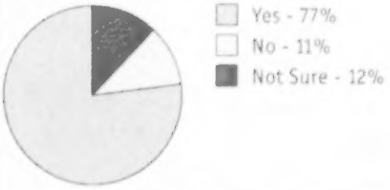


Figure 14. *Planners' responses regarding safety improvements made through design changes.*

In a follow-up question, both loggers and planners were asked to provide comments on how risks had been reduced, or how cutblock and road design could be improved. Respondents raised many issues, some of which are summarized below. Section 6 ("Survey Respondents' Suggestions for Best Safety Practices") compiles 80 specific suggestions made by respondents for "best practices" in the design and layout of roads, cutblocks, and retention areas.

4.6.1 Cutblocks: Shape and Edges

Respondents identified that blocks designed for safety (wide roads and landings, clear falling and yarding space) may limit other values such as revenue (higher costs) and environmental protection (less distributed retention). Small blocks and tree retention areas were identified by respondents as potentially dangerous for both falling and yarding because of the necessity to work in the proximity of overhead hazards.

Planners thought that layout was most often contracted on "least cost" criteria, which they felt resulted in less time available for attention to detail. Loggers commented that they often did not see the block until after layout. They suggested that planners consult with them about layout by hiring an experienced logger for advice before completing block designs. Loggers felt that planners should consider the terrain and its drainage patterns, the location of benches for landings, and the types of equipment that will work in these locations.

4.6.2 Cutblocks: Machine Operating Space

Many planners admitted that they did not know the limitations of logging equipment. Loggers agreed, saying that planners should check out the situation on the ground before completing design and layout. Loggers wanted to see more and larger landings; however, planners who designed landings thought they were working within cost and environmental restrictions. Loggers specifically requested wider, in-block roads to allow machines to stand back from the bank when yarding downhill. Planners commented that the landing might be tight because the best spots were in riparian areas, which often follow benches in the topography.

4.6.3 Roads: Grade, Alignment, and Surface Ballast

Loggers' and planners' comments showed agreement in their opinion that road grades were too steep. Grades in excess of 25% were commonly reported. Respondents recommended a legal limit on grade, variously specified as 18%, 15%, or 12% maximum grade. Planners said that access restrictions through riparian reserves could hamper their ability to design roads with lesser grade, and force poor alignment.

"Lowest cost" was a commonly mentioned issue concerning surface ballast. Respondents observed that road construction contractors bid competitively and the lowest bidder was generally awarded the contract. Respondents said this results in contractors economizing by only spreading ballast (crushed surface rock) where they thought the road might become wet or soft. Truckers said that in bad weather these roads became very hazardous to drive on, and that trucks had flipped over. Truckers recommended that roads should have a 20 cm depth of ballast along the entire length, where applicable (i.e., winter roads did not require ballast as long as they remained frozen).

Another issue raised by respondents was the timing of road construction. Respondents commented that roads were often constructed shortly before logging began. Truckers suggested that the best practice is to build roads two years in advance, allowing them to settle and harden before heavy traffic use.

4.6.4 Roads: Landings, Pullouts, and Sight Lines

Both planners and loggers commented that the number of pullouts should be increased, both along heavy-traffic roads, and within block, to park pickups out of the way of heavy equipment. Loggers noted that brush along forest roadsides has been allowed to encroach over the past few years, and should be cut back to allow greater visibility, particularly to see public vehicles travelling without radios. Planners and loggers both commented that landings should be large enough to accommodate working machines, trucks turning, and crew parking, and level enough for safe decking of timber.

5.0 Safety Issues and Perspectives on Legislation and Policy

When asked whether any government legislation or policy contributed to unsafe work conditions, approximately 25% of loggers and 25% of planners said "yes." An additional 30% of the planners and nearly 40% of the loggers responded that they were "not sure."

In written follow-up comments, survey respondents identified two categories of issues with regard to legislation and policy: (1) administration issues, and (2) environmental policy issues. The administration issues raised encompassed amendments to block boundary and leave tree locations, appraisals, waste and residue assessments known as "take or pay," and the contract payment system. In addition, survey respondents identified the following environmental policy issues as important:

- Retention, including for visual quality, culturally modified trees, biodiversity, and riparian habitat.
- Increases to forest edge length, overhead hazards related to smaller blocks with irregular edges, wildlife leave trees and patches, and riparian buffers.
- Road locations to accommodate environmental protection, and road width and length restrictions to minimize the road "footprint."

Ministry of Forests and Range policy specialists evaluated these safety-related issues in light of the relevant legislation and regulations. This analysis is presented below.

5.1 *Safety-Related Administration Issues*

5.1.1 Block Design Amendments: Planners' and Loggers' Perspectives

The ability to make timely amendments to block boundaries was the primary safety issue related to legislation and policy raised by survey respondents. When asked whether loggers can change block boundaries and the locations of wildlife tree patches, approximately two-thirds of planners selected "don't know," "never," or "occasionally." Loggers reported that layout and leave patches were often placed in unsafe operating locations and that they wished this could be amended to accommodate safety concerns.

Loggers indicated that when they encountered safety issues associated with block design (e.g., boundaries, retention patch edges, etc.) they were instructed to stop work and report to their logging supervisor. The supervisor then took the issue to the licensee. Survey respondents thought that licensees had little flexibility to change block design, as a formal process with the Forest Service was required. Respondents thought that approvals for amendments were onerous and time-consuming because the legislation was not flexible enough to accommodate safety issues once a block was approved for harvesting. For example, a planner commented: " . . . the issue with lack of flexibility is to do with the cutting permit; there is no provision for changing things for safety." Because of the perceived delays associated with the reporting of safety issues related to block designs, safety problems are often worked around, rather than addressed.

Survey respondents also thought that multi-agency referrals were often required to gain approval for amendments and that this led to costly delays.

5.1.2 Block Design Amendments: Policy Perspectives

Survey responses concerning block design amendments were generally associated with the perceived time delays, effort, and costs associated with obtaining amendments. Responses indicated a lack of knowledge or understanding about the current requirements for cutting permit content, including the opportunity to incorporate a significant level of flexibility to meet unforeseen circumstances. The following outlines the distinctions between these two forest management regimes with regard to block design amendments.

Under the FPC and *FRPA*, the use of the Cutting Permit/Road Permit has been clarified. The permit's main role is to designate the location within which licensees can exercise their rights through a cutting authority. Harvesting or road construction outside the authority areas is considered unauthorized harvest. Although the permit holder must abide by *FRPA*, the permit itself does not prescribe the forest practice requirements. Forest practices are managed through Forest Stewardship Plan commitments and practice requirements and subsequent site plans that detail results and strategies that apply to the site.

Under license documents (e.g., Tree Farm Licence, Forest Licence), an application for a cutting permit that is accurate and correct (e.g., free of voids and omissions) cannot be rejected or delayed: the permit must be issued within 45 days of submission, unless one of three conditions applies:

1. the District Manager believes that reasonable efforts to meet with First Nations groups affected by the plan has not occurred or is inadequate,
2. the permit application is inconsistent with content requirements specified in licensee documents, or
3. the permit application is not a part of a forest development unit unless it is for harvesting activities that are exempt from the requirements for an FSP.[4]

In addition, under *FRPA*, a cutting permit delineates only the outer boundary of the harvest development area. Adjustments to retention areas within approved cutting permit boundaries can be made without amendments or prior government approval. Changes that extend beyond cutting authority boundaries are made only for forest management reasons and require approved amendments. Activities (e.g., what is harvested, how harvesting takes place, what is retained, what is removed, etc.) within approved harvest authorities take place at the discretion of the licensee and have nothing to do with the cutting permit application. It is important to note that areas not harvested within an approved cutting authority area, or identified as a retention area, are subject to take or pay rules (see section 5.1.5). The Cutting Permit/Road Tenure Administration Manual outlines content requirements for cutting permits and opportunities for flexibility (B.C. Ministry of Forests and Range 2006a).

4 A new section in the Forest Act (section 81.1) and subsequent regulations is being drafted that will allow for more circumstances in which a cutting permit can be rejected.

5.1.3 Appraisal System: Planners' and Loggers' Perspectives

Survey respondents felt that strict application of the provincial forest appraisal system (see B.C. Ministry of Forests and Range 2007a and 2007b), which establishes stumpage fees, required operations to be undertaken at the lowest cost, limiting the ability to incorporate safety. Respondents commented frequently that the people who approve appraisals (i.e., the Ministry of Forests and Range) usually do not field-check their appraisal allowances and calculations. Some survey respondents thought that MFR often forces changes to licensee submissions to reduce cost allowances and that "least cost" was valued over safety. Some also thought that it was difficult to get MFR approval for higher costs related to safety issues (e.g., to construct more pullouts, and where necessary, wider roads within a block to allow traffic to flow safely).

Respondents also felt that there were insufficient appraisal estimates for road maintenance and thought that it is often unclear who had responsibility for maintenance. This results, in their opinion, in the lowest possible expenditure for road maintenance activities.

Survey respondents felt that appraisal cycle times caused excess driving speed. Truckers thought that a focus on least-cost construction and maintenance led to poor-quality roads and to excess driving speeds to meet the cycle time. One respondent wondered whether "safe" cycle times should be posted on forest roads.

The following are some of the common survey responses concerning the appraisal system.

- Stumpage paid for timber is appraised by government based on anticipated harvest costs.
- To maximize return to the Crown, a "least cost" approach is taken to operation design and implementation.
- It is difficult to get government to accept more expensive, but safer, design and maintenance of roads.
- Government may reject harvest plans after office review of road and harvest plans, without consideration of field-related safety issues.
- Trucking cycle times are estimated in the appraisal process. The appraisal allowance assumes well-built roads, proper maintenance, and good weather. Truckers are paid by the tonne-hour, based on the appraised cycle time. Truckers negotiate a contract with a licensee independent of government.

Many respondents thought that the appraised cycle time was the baseline, and that driving faster than road conditions would safely permit was often required to meet the contracted cycle times.

5.1.4 Appraisal System: Policy Perspectives

An appraisal system is used in British Columbia to establish stumpage fees payable to the Crown for harvested timber (B.C. Ministry of Forests and Range 2007a and 2007b). In part, the appraisal system consists of subtracting the estimated costs of road development, harvesting, and wood delivery from the estimated market value of the timber. This system generally does not recognize individual costs, but applies averaged costs for phases based on audited licensee cost analyses.

Appraisal data is reviewed at the forest district and regional levels, and can include an on-site review on a sample basis. Compliance and enforcement staff, on a risk-assessment basis, may also review appraisal data during select site inspections. Appraisal data submissions are completed by accountable forestry professionals (i.e., members of the Association of British Columbia Forestry Professionals [ABCFP]), who are professionally bound by the ABCFP's Code of Ethics. Section 3.10 of this code states that the professional must: " . . . have regard in all work for the safety of others." Professional obligations apply to the individual forestry professional and not to the licensee. Forestry professionals have an obligation to consider safety: where safety is not specifically addressed as a part of the licensee's obligation, the forestry professional must advocate for, but cannot necessarily impose, its proper consideration.

For new road construction, licensees who submit road designs are responsible for meeting current safety standards before least-cost evaluations are carried out. Appraisal policy dictates that the cost estimate must be based on an appropriate standard of road for the projected level of traffic. Mainline and complex construction costs are based on individual "Engineered Cost Estimates" (ECE) that are submitted to government by the licensee. Non-complex branch and block road costs are assigned a tabular cost. Reconstruction and upgrading of old or existing roads receive individual ECE allowances.

Forest district average costs, based on audited licensee cost analyses, are allowed for routine or "surface" road maintenance. Major repairs or "structural" maintenance activities receive individual ECE cost allowances. Appraisal cycle times include an allowance for loading, unloading, and unavoidable delays, which may vary the time required to

transport logs from the harvest area to the licensee's choice of manufacturing site. Appraisal cycle time is a volume-weighted average for all cutblocks within the cutting authority to the point of appraisal, which may not be the dryland sort or mill where logs are actually delivered. The "cycle time" paid to truckers is a business contract between a licensee and the trucker that is independent of the government calculation of cycle time allowances.

Appraisal cost estimates are adjusted periodically based on audited licensee cost analyses. Appraisals are trended for differences in the cost base of the appraisal and the most current cost base. The Market Pricing System has an adjustment for inflation. Given the nature and implications of appraisal cost allowances (including those for safety), disagreements can occur between licensees and government. In such cases, a mechanism exists for an appeal through the Forest Appeals Commission.

5.1.5 "Take or Pay": Planners' Perspectives

This issue was raised by dozens of planners. "Take or pay" refers to the financial penalty imposed for leaving standing timber within an approved cutting area. The following comment represents the belief of many survey respondents: "the current payment system values revenue first, stewardship second, and safety third." Planners noted that small patches of timber located on rock outcrops or tight corners in a block may provide unsafe working conditions for machinery, fallers, and yarding crews; however, some of these areas were difficult to identify at the planning stage and may only become apparent during harvesting operations.

Planners felt that the "take-or-pay" approach forced loggers to cut everything as mapped in approved cutting permits even though it might be unsafe to do so (i.e., including small areas that may be unstable, unsafe, or unsuitable). Although planners knew that licensees could legally leave the timber, they thought there was a financial penalty for doing so and, as a result, these areas were often harvested regardless of existing safety issues. Some survey respondents recommended that a standard clause should be included in cutting permits regarding harvest flexibility for safety.

5.1.6 "Take or Pay": Policy Perspectives

The current take-or-pay policy classifies waste as either unavoidable or avoidable (B.C. Ministry of Forests and Range 2006b). Billings are based on the avoidable waste only. Waste assessments are conducted in accordance with the provincial Logging Residue and Waste Measurement Procedures (B.C. Ministry of Forests and Range 2006b), which provide guidance and direction to all parties concerned. According to MFR field procedures, waste classification must not be biased for any reason including: accommodating inadequate planning and supervision; poor harvesting methods; inadequate or careless logging practices; or a licensee's own manufacturing or market specifications.

Unavoidable waste refers to waste that:

- is inaccessible or physically obstructed, or
- could not be felled, bucked, or removed due to safety or environmental reasons.

The take-or-pay policy encourages full recovery and utilization of merchantable timber. However, unavoidable waste is not assessed a penalty. This policy provides significant latitude to ensure unsafe areas are excluded from harvesting. For example, unavoidable waste related to safety considerations includes:

- the portion of a high stump (with a rock against it) between the maximum allowable stump height and the height where the stump could have been safely cut,
- logs with shards of imbedded rock from blasting,
- log pieces that were cut to create escape paths for fallers,
- bucking waste with severe deformities, and
- logs that were unsafe to remove due to site-specific circumstances.

Notwithstanding the above, determinations of avoidable or unavoidable waste are subjective decisions that are made after harvesting is completed. At times, opinions may differ about whether waste was truly unavoidable due to safety reasons. These issues are usually resolved on a case-by-case basis.

5.2 *Safety-Related Environmental Policy Issues*

Survey respondents believed that management of multiple and conflicting environmental values poses safety challenges. They thought that difficulties in understanding and interpreting policy could sometimes result in unsafe work conditions. However, both planners and loggers considered environmental protection policy to be a much lesser issue for worker safety than fatigue or education (see Figure 7). The following sections focus on policy issues surrounding the location of retention/reserve areas, and the design, layout, and maintenance of industrial forest roads.

5.2.1 Retention Locations and Reserve Areas: Planners' and Loggers' Perspectives

Retention locations are especially important for cable yarding efficiency and safety, largely to prevent logs yarded on cables from damaging retained trees. Loggers said that for safety, retention on steep ground should be kept at least one tree length away from roads. Planners noted that if retention is focussed on areas unsafe for falling, a representative ecological legacy might not be left. Loggers suggested that an experienced person should be consulted about retention locations, and that retention could create problems for both safety and efficiency if not adequately designed with falling, yarding, and hauling constraints in mind.

From the loggers' perspective, tree retention within a block increases the precision required for directional falling (more time) and therefore increases production pressure. "Fall away only" near fish bearing creeks also takes more time, and is dangerous because trees generally lean toward the creek. Fallers said that retention increases hang-ups and overhead debris hazards. In addition, some fallers believed that they could not remove "natural worksite hazards," such as standing dead trees on block edges or within wildlife tree patches.

Planners observed that riparian reserves often forced roads into poor locations. Roads were forced to zigzag steeply up through a block to avoid the reserved area, rather than assuming a wider, more gently rising grade with fewer switchbacks. Loggers noted that it was often difficult to leave trees while falling on steep slopes and preferred that, where possible, retention areas be located on block edges or relatively flat ground.

5.2.2 Retention Locations and Reserve Areas: Policy Perspectives

Under *FRPA*, cutting permits show the outer edge of the cutblock area, but not the location of retention patches. To address billing and waste issues, retention patches are shown on the appraisal map. Retention areas are also shown on site plans. To accommodate operational concerns, a prescribing forester can relocate retention patches within site plans (without government approval) if the same level of overall retention is maintained.

Wildlife/danger tree assessment procedures, which have been developed co-operatively by the MFR, MOE, and WSBC, are in place for the assessment and treatment of trees that pose a potential danger to forest workers (see, Wildlife Tree Committee of British Columbia 2005). Removal of worksite hazards, such as overhead hazards, is covered under WorkSafeBC legislation.[5] Fallers are to work around (e.g., create a no-work zone), fell, or otherwise eliminate such hazards.

5.2.3 Road Locations and Width: Planners' and Loggers' Perspectives

Logging truck drivers suggested that road layout should have truck driver input. They felt designers should realize that truckers now use larger trucks that carry more weight and require more swing room than previously. Loggers observed that many planners had never been in a logging truck. Loggers suggested that better-quality roads should be built and maintained for current and future users. They said that temporary roads were built as cheaply as possible because they would often be de-commissioned after harvesting was completed.

As with block boundaries, planners perceived that road and bridge locations could not be changed without an amendment requiring Forest Service approval. Planners noted that the best physical locations for roads were often along benches in the topography where riparian reserves are located.

5 RSBC 1996, Chapter 492, Workers Compensation Act, Occupational Health and Safety Regulation (B.C. Reg. 296/97), Section 26: Forestry Operations. See: http://www2.worksafebc.com/publications/OHSRegulation/Part26.asp

Planners suggested that potential for road design alterations existed where multiple licensees were operating in the same area. They said that sometimes each licensee built their own roads, rather than collaborating to build more efficient shared roads.

Both planners' and loggers' comments showed agreement in the belief that road widths were often too narrow for safe travel. They said that everything was built to minimum specification and cost, and that roads should not be in this "least cost" category. They also added that the allowable percentage of the land base allocated to permanent site disturbance (roads, pullouts, and landings) was limited by legislation, resulting in a road design that was often too steep (to minimize length) and too narrow for safe driving.

5.2.4 Road Locations and Width: Policy Perspectives

Section 50(1) of the Forest Planning and Practices Regulation (FPPR)[6] limits the construction of roads in riparian management areas, unless the road is required as part of a stream crossing, or locating the road adjacent to the riparian area would create a higher risk of sediment delivery to the protected water bodies, or there is no other practicable option for locating the road.

Section 36 of the FPPR[7] limits permanent access structures to 7% of the cutblock area, but allows that limit to be exceeded if necessary for the safety of road users. Under Section 12 of the FPPR[8], a licensee may propose alternative limits, and conditions to exceed those limits, in the results or strategies specified in their Forest Stewardship Plan. If alternative limits are approved in an FSP, application of this flexibility, within approved limits, does not require additional administrative steps or approvals.

5.2.5 Road Maintenance: Planners' and Loggers' Perspectives

Planners suggested that road use permits were weak, with little commitment to responsibility for maintenance costs. They thought that the Ministry of Forests and Range had no minimum enforceable standards. They also pointed out that accidents on forest roads were no longer reported to the Ministry, so road design and maintenance factors that may have contributed to accidents were not recorded or considered in future road design.

Loggers also commented that routine maintenance should be mandatory. Truckers thought that poor maintenance increased driver fatigue and broke equipment. When the trucker reached a public highway after driving a load quickly over rough roads, the integrity of the truck may be compromised and affect public safety. Truckers repeated often that roads should have more surface rock applied, should be ploughed of snow in winter, and winter roads should be gravelled regularly.

Planners noted that many multi-purpose roads were used for forest harvesting, oil and gas access, First Nations community access, mining access, and public recreational use. Planners frequently commented that there was no clear responsibility for maintenance of these multi-use roads.

5.2.6 Road Maintenance: Policy Perspectives

Current legislation (FPPR, Section 72)[9] requires that the person who constructs and maintains roads must ensure that those roads and associated structures are structurally sound and safe for use by industrial users. This includes protecting the structural integrity of the road prism and clearing width, and ensuring that the road drainage system is functional (FPPR, Section 79[6]).[10] Under Section 79(2) of the FPPR, roads must be maintained until deactivated, until road use permits are issued to another party, or until the road comes under the jurisdiction of the Forest Service. Responsibilities for road maintenance are discussed above in Section 5.1.4 ("Appraisal System: Policy Perspectives"). As pointed out by survey respondents, there previously (prior to the Forest Practices Code) was a requirement to report accidents on designated Forest Service roads, which account

6 Forest and Range Practices Regulation (B.C. Reg. 14/2004), Section 50. See: http://www.for.gov.bc.ca/tasb/legsregs/frpa/frparegs/forplanprac/fppr.htm#section50

7 Forest and Range Practices Regulation (B.C. Reg. 14/2004), Section 36. See: http://www.for.gov.bc.ca/tasb/legsregs/frpa/frparegs/forplanprac/fppr.htm#section36

8 Forest and Range Practices Regulation (B.C. Reg. 14/2004), Section 12. See: http://www.for.gov.bc.ca/tasb/legsregs/frpa/frparegs/forplanprac/fppr.htm#section12

9 Forest and Range Practices Regulation (B.C. Reg. 14/2004), Section 72. See: http://www.for.gov.bc.ca/tasb/legsregs/frpa/frparegs/forplanprac/fppr.htm#section72

10 Forest and Range Practices Regulation (B.C. Reg. 14/2004), Section 79. See: http://www.for.gov.bc.ca/tasb/legsregs/frpa/frparegs/forplanprac/fppr.htm#section79

for approximately 20–25% of forest roads in the province; however, this requirement no longer exists. Accidents that result in injury are reported to WSBC, who are responsible for appropriate investigations and reporting.

In addition, specific WorkSafeBC regulations, including Sections 4 and 26 of the Occupational Health and Safety regulation,[11] govern safe worksites, road grades, surface condition, sight lines, and other road design issues that are all subject to WorkSafeBC inspections.

Road use and maintenance responsibilities are generally negotiated as third-party agreements between various users of the same road or road network. For example, Section 22.3 of *FRPA*[12] states that the road use permit holder may provide written notice to industrial road users requiring payment to contribute to the expense of maintaining the road or road network. Road use agreements can detail, among other things, maintenance schedules and associated proportional licensee costs.

5.2.7 Driving Speeds: Planners' and Loggers' Perspectives

Planners suggested that excessive driving speed was partly due to the lack of worker pay for commuting time. Workers often travelled an hour or two each way to the job site at their own cost, and wished to minimize commuting time. Some respondents suggested that speed limits be posted on forest roads to match road design and maintenance conditions. Respondents also recommended driving speed enforcement, and expressed concerns about the idle chatter on radios used to co-ordinate traffic flow.

Loggers agreed that signage and speed control were required. Logging truck drivers frequently commented that speeding was required to meet appraised cycle times (see Section 5.1.3). A common theme among truck driver responses was that the trucking community, which consists of many small independent operators, thought it had no means of appeal regarding cycle times or road conditions.

5.2.8 Driving Speeds: Policy Perspectives

Section 4 of the Forest Service Road Use Regulation (FSRUR) specifies that operators of vehicles on forest service roads must use speeds that are safe for the road conditions (i.e., no more than 80 km/hr, or posted speed).[13] Additionally, Section 6(1) of the FSRUR allows a district manager to erect a traffic control device on a forest service road, and Section 6(5) specifies that a person must not operate a vehicle contrary to a traffic control device. Specific speed restrictions on industrial roads are regulated under the Industrial Roads Act.[14]

In addition, Section 5(1) of the FSRUR[15] applies to use of two-way radios on Forest Service roads. Using radios, drivers must announce their positions to other drivers according to posted road markers.

Section 26.83[16] of WorkSafeBC's Occupational Health and Safety Regulation applies to the use of traffic control systems on forest roads. For example, on sections of road that are too narrow to permit vehicles to pass, traffic control systems must include (where required) turnouts and warning signs. Vehicle headlights should be turned on, as should flashing beacons (if fitted on the vehicle). The system must also include instructional signs, including kilometre and road name/number signs and the radio frequency for traffic control, if one is being used.

An initiative led by the Forest Service is currently under way to develop consistent standards for resource roads in British Columbia. Seven ministries presently have various jurisdictions over aspects of resource roads. A proposed *Resource Roads Act*, with regulations covering (1) permitting, (2) construction, maintenance and deactivation practices, (3) road use, and (4) enforcement provisions is in draft form and undergoing legal review.

11 RSBC 1996, Chapter 492, Workers Compensation Act. Occupational Health and Safety Regulation (B.C. Reg. 296/97). See: http://www2.worksafebc.com/Publications/OHSRegulation/Home.asp

12 SBC 2002, Chapter 69, *Forest and Range Practices Act*, Section 22(3). See: http://www.for.gov.bc.ca/tasb/legsregs/frpa/frpa/part3.htm#section22

13 Forest Service Road Use Regulation (B.C. Reg. 70/2004), Section 4 and 6. See: http://www.for.gov.bc.ca/tasb/legsregs/frpa/frparegs/forservroaduse/fsrur.htm

14 RSBC 1996, Chapter 189, Industrial Roads Act, Part XX, Vehicular Traffic On Industrial Roads Regulations (B.C. Reg. 450/59), Section 68, Speed Restrictions. See: http://www.qp.gov.bc.ca/statreg/reg/I/IndustrialRoads450_59/450_59.htm#section68

15 Forest Service Road Use Regulation (B.C. Reg. 70/2004), Section 5(1). See: http://www.for.gov.bc.ca/tasb/legsregs/frpa/frparegs/forservroaduse/fsrur.htm#section5

16 RSBC 1996, Chapter 492, Workers Compensation Act. Occupational Health and Safety Regulation (B.C. Reg. 296/97), Section 26.83. See: http://www2.worksafebc.com/Publications/OHSRegulation/Part26.asp#SectionNumber:26.83

6.0 Survey Respondents' Suggestions for Best Safety Practices

In both the planner and logger surveys, the project team asked participants to identify the practices that were either in use or should be used to improve safety. The aim behind this question was to build a comprehensive list of "best practices" that could form the basis of an Industry Recognized Practices (IRP) planning handbook for road, cutblock, and retention area design and layout, as well as guiding future effectiveness evaluations.

6.1 *Loggers' Suggestions for Best Safety Practices*

Loggers' responses to the survey question "how would you improve design" are presented below in three general categories: (1) planning, (2) road construction and maintenance, and (3) communications.

6.1.1 Loggers' Suggestions Concerning Best Practices for Planning

- Consult representatives from each department (harvesting and truck drivers) during the design phase.
- Planners require a detailed understanding of the logging process.
- Incorporate windthrow considerations into planners' designs.
- Remove areas of questionable stability from the harvest area—put outside of the block or into reserves.
- Place steep and rocky slopes and deep draws in wildlife tree patches.
- Design roads and landings for the most demanding equipment (e.g., tandem axle versus tri-axle, short-log, and super-B truck configurations) or specify the equipment to be used.
- Align roads on and off bridges to be as straight as possible.
- Accommodate the harvesting method, hauling equipment, and traffic levels in the design of landings, pullouts, and roads.
- No roads grades over 18%.
- Accommodate larger trucks and greater traffic levels with flat, wide switchbacks.
- Downhill yarding corridors to be at least two-thirds of a tree length wide.
- Block corners to be at least 1.5 tree lengths wide across the slope for safe falling.

6.1.2 Loggers' Suggestions Concerning Best Practices for Road Construction and Maintenance

- Design landing size to accommodate loading activities as well as the safe movement of other equipment and personnel.
- Landing locations should minimize adverse skidding and suit the lean of the timber.
- Lean corners appropriate for truck speed, and eliminate in-slope and out-slope surfaces on straight stretches.
- Design road width and the number and location of pullouts with consideration of truck type, traffic levels, and travel speed.
- Use natural benches for roads and landings wherever possible.
- Reduce or eliminate sharp corners where possible.
- Grade and resurface roads more frequently to ensure safe operation at design speeds (as per appraised cycle time).
- Keep roadsides clear of brush.
- Plough snow promptly in working areas.

6.1.3 Loggers' Suggestions Concerning Best Practices for Communications

- Arrange more "walk and talk" opportunities between planners, loggers, and truck drivers.
- Ensure a stronger interaction between layout and harvesting operations.
- Post provincially consistent road speed limits, hazards, road names, mileage markers, and radio signage.
- Reduce misunderstanding and opportunities for mistakes with industry-standardized flagging colours for layout of roads, landings, and cutblocks.
- Record accurate slope, grade, and hazard information on maps.

6.2 *Planners' Suggestions for Best Safety Practices*

Planners' responses to the survey question "describe what you did to change the design to improve safety" are presented below in four general categories: (1) planning, (2) road construction and maintenance, (3) harvest considerations, and (4) communications.

6.2.1 Planners' Suggestions Concerning Best Practices for Planning

- Remove areas from harvest if too dangerous to fall.
- Move road locations to decrease sustained gradient.
- Avoid unstable slopes.
- Establish machine-free zones for steep and rocky areas.
- Increase road curve radius.
- Eliminate road network and re-design for helicopter logging.
- Avoid steep downhill cable yarding.
- Design cable blocks with single-span deflection.
- Specify use of a deadman where tail-holds are inadequate.
- Place landing back from the hill, or away from perpendicular, so that the yarder is not in line with a runaway log.
- Recommend hoechucking in areas too steep for skidders.
- Eliminate small areas of tracked requirement in predominantly rubber-tire operations.
- Eliminate snag hazard by changing single-tree selection to patch cuts.
- For safety reasons, change partial cuts to clearcuts.
- Examine areas above the block (not just within) for instability.
- Consult with a geotechnologist for any slopes over 60%.
- Place danger tree types into no-log wildlife tree patches.
- Use round block boundaries to allow fallers to drop trees safely.
- Limit seasonal timing of operations.
- Use short spurs to access safe landing locations.
- Plan effectively for windthrow potential.
- Walk the ground before laying out the harvest.

6.2.2 Planners' Suggestions Concerning Best Practices for Road Construction and Maintenance

- Develop infrastructure to accommodate increased traffic in mountain pine beetle salvage areas.
- Provide level turn-around areas.
- Provide breaks before and after steep pitches, and when coming into and out of switchbacks.
- Upgrade old roads to accommodate current truck configurations and lowbeds.
- Design loop roads within blocks to accommodate one-way traffic (on flat terrain).
- Reduce grades for blocks that will be logged in winter.
- Be sensitive to bridge crossing locations and approaches.
- Ensure road junctions provide good visibility and room for large trucks.
- Improve drainage and line of sight.
- Widen rights-of-way.
- Use proper amount of turnouts for the traffic volume.
- Do not exceed established grade limits (many accidents occur on grades > 18%).
- Consider grades of roads approaching corners, and run-away room.
- Avoid adverse gradients.

6.2.3 Planners' Suggestions Concerning Best Practices for Harvest Considerations

- Design standards that specify sightline and run-out lengths for roads.
- Design for the equipment that will be used, or specify the appropriate equipment.
- Avoid direct downhill yarding to landings.
- Reduce grades on backspar trails to a maximum of 35%.
- Provide road signage.
- Increase distance between leave trees to allow for safe machines operation.
- Ensure enough log deck and manoeuvring space in landings.

6.2.4 Planners' Suggestions Concerning Best Practices for Communications

- Manager, layout and prime contractor sign-off on cutblocks after pre-work.
- Discuss slope stability issues and timing of operations for steep slopes.
- Maps identify safety hazards, such as danger trees and avalanche areas.
- Obtain contractor input for road design.
- Conduct field tours and discuss with operations people.
- Train workers in map reading and interpretation.
- Hang warning ribbons regarding hazards outside the block.
- Involve production crews at the time of layout.
- Field check and supervise the layout crews.
- Improve radio communication in block and on roads.
- Co-operate with other professionals, including WSBC industry specialists.

7.0 CONCLUSIONS AND RECOMMENDATIONS

In 2005, 43 fatalities and 110 serious injuries occurred in British Columbia's forest industry. In 2006, there were 12 fatalities. In response to the 2005 record, the Forests and Range Practices Advisory Committee requested that the Forest and Range Evaluation Program (FREP) investigate some of the reasons behind the causes for this worker safety record.

In fulfilling the request, this FREP evaluation project examined the planning and design of partial cutting, wildlife tree retention, and forest road building in British Columbia to:

- identify and evaluate the causes of any impacts on worker safety related to these activities;
- identify whether the *Forest and Range Practices Act* or other legislation negatively affects safety associated with these activities, either by mandating unsafe practices or by restricting practitioner's ability to implement safe practices; and
- identify planning practices to eliminate or minimize the known safety-related impacts of these activities for potential inclusion in an Industry Recognized Practices (IRP) safety-planning handbook.

The project team used a three-pronged approach to meet these objectives. First, an analysis of a WorkSafeBC database describing accepted injury claims was undertaken to provide context and guide the development of the evaluation project. Second, a safety survey was developed for distribution to forestry workers. Third, Ministry of Forests and Range (MFR) policy specialists conducted an analysis of relevant legislation and regulations pertaining to worker-identified safety-related issues.

This evaluation report presents both quantitative and qualitative results. The quantitative research results yielded statistically significant findings and the qualitative information (comments and written responses by survey respondents) provided an operational reality, which is often unattainable through strictly quantitative means. Seeking the opinions of respondents about their operational reality was considered not only responsible and defensible science, but respectful of the workers' role in their safety.

The WorkSafeBC database contained descriptions of more than 12 000 forest-sector accidents with accepted injury claims from 2000 to 2005. Analysis of these claims showed that fallers sustained the highest rate of serious injury (6.8%). The data series also revealed a generally declining annual number of injuries, from 2704 accepted claims in 2000 to 1698 claims in 2005; however, the percentage of serious injuries reported over this period increased, particularly in the falling and transport categories. The WorkSafeBC database helped guide the development of this evaluation project and provided context for the development and interpretation of resulting forest worker and planner surveys.

While the WorkSafeBC database analysis provided a snapshot of prevalent safety issues over the 6-year period, it did not provide detailed results of investigations or summaries of causative factors. The project team, therefore, developed the survey format (see Appendix 1 and 2) to elicit direct responses from forest industry workers about their experiences. A total of 770 forest industry workers ("planners" and "loggers") responded to these surveys. The survey distribution achieved broad geographic coverage and canvassed a wide range of occupations, experience levels, and employer types. The email distribution to forest planners through the Association of BC Forest Professionals (ABCFP) yielded 509 respondents, a sample size estimated by BC Stats as accurate to within ± 4.4%. Forest operations workers completed 261 surveys, a sample size estimated by BC Stats as accurate to within ± 6.1%.

Quantitative information was collected through the compilation of the survey participants' categorical responses to pre-defined question selections. Qualitative information was obtained from participants' written or interview comments. Survey responses identified many specific issues that commonly affect worker safety. The respondents' comments were summarized and reported in several topic areas, including: cutblock design and layout; road design, construction and maintenance; and issues of policy and legislation.

Although forest planners and loggers who responded to the surveys felt that forest policy and legislation played a somewhat negative role in worker safety, both groups agreed that the primary causes of accidents and injuries were more often related to production pressures, fatigue, lack of training, and lack of experience. In addition, when asked about the level of communication between forest planners and operations workers, survey participants' responses revealed that little direct communication occurred. Almost all respondents felt that improved communications, and greater knowledge of the others' work, would greatly improve worker safety.

In the policy realm, respondents most frequently articulated

concerns involved a lack of flexibility for workers to adjust block boundaries or leave unsafe areas unharvested, and the inability to achieve safety-related appraisal cost allowances. Ministry of Forests and Range legislation and policy specialists reviewed these concerns in light of the current management requirements of the *Forest and Range Practices Act* (*FRPA*). The analysis indicated that *FRPA* did not appear to create any direct barriers to safety; issues were more related to inconsistent implementation of the policy by both industry and government staff rather than the policy itself.

This apparent difference in observations between the survey respondents and the MFR policy specialists underscores the timing of survey administration during the transitional environment that surrounded the implementation of *FRPA*. Clearly, some survey participants based question responses on their experiences with the previous Forest Practices Code (FPC) rather than on management under *FRPA*. Therefore, much of the survey information presented in this evaluation report should be considered as baseline data with which to compare the safety record under *FRPA* to that under the FPC. The difference in observations does, however, highlight a need for enhanced communication of current policy to forest industry planners and workers, and to government staff.

To meet the third project objective, survey participants were asked to identify specific practices that were either in use or that should be used to improve worker safety. Section 6 lists 80 specific suggestions. It is hoped that this information will prove valuable to forest managers and policy decision makers in highlighting safety issues. Following further refinement through discussion with specialists, these responses could form the basis of a "best practices" handbook.

Through review of the survey responses and discussions with forest policy experts and draft report reviewers, it is clear government has an obligation to ensure that regulations and policies (and their implementation) are flexible and adaptive so that they do not become barriers to worker safety. At the same time, industry must ensure safety is not used as a reason to gain operational or economic advantage, or accommodate inadequate pre-harvest planning. Otherwise, the overall effort to improve forest worker safety will be jeopardized.

Since this project began, several other important safety initiatives have either been completed or started, including several Coroners' Inquests and the Auditor General's Report on forest worker safety. In addition, MFR has committed to the development of a comprehensive Action Plan for Forest Worker Safety. This action plan will require an analysis of the possible actions and options presented by the various safety initiatives.

In light of these safety-related initiatives, the findings of this evaluation report clearly represent just one component of a large and complex process. The insightful contributions of the 770 forest industry workers who responded to the safety survey, along with the policy analysis included in this report provide valuable perspectives for the other high-profile safety initiatives currently under way. Drawing on these results, the project team offers the following recommendations for MFR to consider when developing its Action Plan for Forest Worker Safety.

1. To ensure safety roles and responsibilities are agreed to and understood, a safety responsibility and accountability framework should be developed. This framework should include individual roles, responsibilities, rights, and obligations for forest safety. To ensure this framework is utilized, it should be delivered along with an awareness campaign.
2. To ensure that harvest plans can be designed and carried out safely and to help build a stronger province-wide safety culture (e.g., worker safety comes first), the following are recommended:
    a. a training, mentoring or apprenticeship program for planners and forest workers,
    b. ongoing information-sharing safety forums that involve government, professional bodies, and industry associations, and
    c. pre-harvest and (or) post-harvest safety meetings or other effective forms of on-site information sharing, between planners, supervisors, and loggers.

3. To increase overall awareness of existing forest policy and procedures, the methods used to communicate cutting permit and appraisal policy and procedures to licensee and government staff should be reviewed.[17]

4. To help ensure adequate road maintenance, and thereby enhance the safety of those using forest roads in British Columbia, "Road Use Agreements" are recommended where more than one licensee is operating on a road, or road network.[18]

5. To determine whether our safety record is improving, it is imperative that the forest sector, including industry, government agencies, WorkSafeBC, and the BC Forest Safety Council, work collaboratively in developing an information system that will clearly establish appropriate baseline safety data.[19]

6. To aid the development of guidelines for forest roads by the ABCFP and the Association of Professional Engineers and Geoscientists of British Columbia, the Joint Practices Board should consider the following recommendations:

   - Describe professional responsibilities and accountabilities for the design, construction, safety standards, and maintenance of forest roads;
   - Include a section on relevant policy that incorporates limitations and opportunities for flexibility; and
   - Include the "Best Safety Practice" recommendations identified by planners and loggers during this survey.

17 For example, procedures that allow for timely, safety-related amendments to block boundaries, reserve areas, and leave-tree locations, and allowances for engineered cost and appraisal estimates. The communication chain between and within organizations (government and industry) should also be reviewed to ensure that knowledge and awareness of policies and procedures is better conveyed to end-users of this information.

18 Licensees should be encouraged to work co-operatively to develop, approve, and implement these agreements.

19 This data system would ensure that the appropriate information is gathered, evaluated, and freely shared in a timely manner to continually improve safety performance for everyone using British Columbia's forest resources.

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The FREP Mission:
To be a world leader in resource stewardship monitoring and effectiveness evaluations, providing the science-based information needed for decision-making and continuous improvement of British Columbia's forest and range practices, policies and legislation.
Forest Range Evaluation Program
http://www.for.gov.bc.ca/hfp/frep/index.htm

APPENDIX 1. SAFETY SURVEY FOR FOREST PLANNERS

Safety Survey *for* Forest Planners

Location: _____ Date: _____

This is a forest worker safety survey being undertaken by the Forest and Range Evaluation Program (FREP) of the Ministry of Forests and Range, in partnership with the Forest Safety Council and the Association of BC Forest Professionals. This survey is designed to look at how the planning, design and layout of forest harvest units and roads affect worker safety in subsequent operations.

By completing this survey, you will ensure your opinion is heard, and you will help improve safety in our forests. Completing the survey takes about 15 minutes.

Approximately 2000 people representing all phases of forest planning and harvesting, throughout British Columbia, will be asked to complete this survey.

Your responses will help us:

- identify if there are any forest worker safety issues associated with the planning and design of harvest units, partial cutting systems, and forest road building
- identify the frequency with which any issues arise
- identify legislation or policy that may cause unsafe practices
- identify forest industry safe practices
- provide recommendations to enhance existing safe practices related to the design and layout of forest harvest units and roads.

Thank you for contributing your knowledge and suggestions.

If you have any questions about this survey, contact any of:

Peter Bradford	email: peter.bradford@gov.bc.ca	phone: 250-356-2134
Bill Belsey	email: belsey@citytel.net	phone: 250-627-9781
Gerrard Olivotto	email: gerrard@olivotto.com	phone: 250-920-6749

Please send the completed survey forms to:

Peter Bradford
c/o Forest Worker Safety Survey
Forest Practices Branch
Ministry of Forests and Range
PO Box 9513 Stn Prov Govt
Victoria, BC
V8W 9C2

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Safety Survey for Forest Planners

1. *What are the top four worker safety issues you consider in the design of cutblocks and roads?*

1. _____
2. _____
3. _____
4. _____

2. *What do you think most negatively impacts forest worker safety? Select up to three boxes.*

❑ Production pressures ❑ Machinery condition ❑ Personal safety equipment availability

❑ Lack of training ❑ Lack of experience ❑ Environmental policy

❑ WCB policy ❑ Fatigue ❑ Other _____

Comments (e.g., provide any specific details):

_____

_____

3. *Is there forest policy, legislation or regulation that conflicts with your ability to ensure cutblock (including reserve areas) and road designs incorporate worker safety?*

❑ Yes ❑ No ❑ Not sure

If yes, please describe: _____

_____

_____

4. *Are pre-harvest or pre-work reviews done with harvesting crews and truckers prior to road development and/or harvesting?*

❑ Never ❑ Occasionally ❑ Often ❑ Always

Comments (e.g., type of review, with whom):

_____

_____

5. *Do you hear from harvesting crews and truckers about their safety concerns?*

❑ Never ❑ Occasionally ❑ Often ❑ Always

Comments (e.g., how do you hear their concerns?):

_____

_____

6. *Do you allow loggers to make changes to boundaries, reserve tree locations, etc. where they encounter unsafe conditions?*

❑ Never ❑ Occasionally ❑ Often ❑ Always

Comments (e.g., type and scale of changes):

7. *Have you ever been invited to participate in a forest worker accident investigation where layout, planning or engineering issues were considered to be a factor in the incident?*

❑ Yes ❑ No ❑ Not sure

If yes, please describe:

Comments (e.g., what did you change?):

8. *Have you reduced or eliminated specific safety risks through planning and design? Some of these may be specific to slope, timber type, MPB, etc.*

❑ Yes ❑ No ❑ Not sure

If yes, please describe:

9. *What level of training have you had on considering the impact on worker safety of cutblock and road design or construction practices?*

❑ Limited ❑ Moderate ❑ Comprehensive

Please indicate the type of training:

❑ College or University course ❑ WorkSafeBC (WCB) course

❑ Professional organization ❑ Company course

❑ Mentoring on the job ❑ Other

Please describe how effective this training was at changing the way you looked at incorporating safety into cutblock and road design or construction practices?

Safety Survey for Forest Planners

10. *How familiar are you with requirements for worker safety under WCB regulations?*

❑ Limited ❑ Moderate ❑ Comprehensive

Comments:

11. *Who do you think is responsible for worker safety? Please rate each of the following by their responsibility level, ranging from 0 (not responsible) to 5 (highly responsible).*

_____ Government	_____ Licensee Management	_____ Planner
_____ Logging Supervisor	_____ Contractor	_____ Worker
_____ WCB	_____ Union	_____ Other

Do you have any additional comments or suggestions?

Safety Survey for Forest Planners

Your Profile:

Please complete the following information to allow us to profile survey participants.

What is your occupation or title? _____

How many years have you worked in the forest industry? _____

How many years have you worked in your current position? _____

Do you work for a:

- ❑ licensee
- ❑ contractor
- ❑ sub-contractor
- ❑ government agency
- ❑ BCTS
- ❑ other _____

What size of organization is this? (No. of employees)

- ❑ 1–5
- ❑ 6–20
- ❑ 21–50
- ❑ 51–100
- ❑ 100+ workers

Where do you work?

- ❑ Northern Interior
- ❑ Central Interior
- ❑ Southern Interior
- ❑ North/Central Coast
- ❑ South Coast
- ❑ Vancouver Island

This survey is designed to be anonymous. However, we expect that further questions will arise. Would you allow us to contact you at a future date with some follow-up questions?

If yes, please complete the following:

Name: _____

Mailing address: _____

_____

Email: _____

Telephone: _____

Thank you again for contributing your knowledge and suggestions. The information gathered in this survey will improve forest worker safety in British Columbia.

APPENDIX 2. SAFETY SURVEY FOR FOREST OPERATIONS WORKERS

Safety Survey *for* Forest Operations Workers

Location: _____ Date: _____

This is a forest worker safety survey being undertaken by the Forest and Range Evaluation Program (FREP) of the Ministry of Forests and Range, in partnership with the Forest Safety Council and the Association of BC Forest Professionals. This survey is designed to look at how the planning, design and layout of forest harvest units and roads affect worker safety in subsequent operations.

By completing this survey, you will ensure your opinion is heard, and you will help improve safety in our forests. Completing the survey takes about 15 minutes.

Approximately 2000 people representing all phases of forest planning and harvesting, throughout British Columbia, will be asked to complete this survey.

Your responses will help us:

- identify if there are any forest worker safety issues associated with the planning and design of harvest units, partial cutting systems, and forest road building
- identify the frequency with which any issues arise
- identify legislation or policy that may cause unsafe practices
- identify forest industry safe practices
- provide recommendations to enhance existing safe practices related to the design and layout of forest harvest units and roads.

Thank you for contributing your knowledge and suggestions.

If you have any questions about this survey, contact any of:

Peter Bradford	email: peter.bradford@gov.bc.ca	phone: 250-356-2134
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Please send the completed survey forms to:

Peter Bradford
c/o Forest Worker Safety Survey
Forest Practices Branch
Ministry of Forests and Range
PO Box 9513 Stn Prov Govt
Victoria, BC
V8W 9C2

Safety Survey for Forest Operations Workers

1. *What do you think most negatively impacts forest worker safety? Select up to three boxes.*

- ❑ Production pressures
- ❑ Machinery condition
- ❑ Personal safety equipment availability
- ❑ Lack of training
- ❑ Lack of experience
- ❑ Environmental policy
- ❑ WCB policy
- ❑ Fatigue
- ❑ Other _____

Comments (e.g., provide any specific details):

2. *Do you ever talk to government or licensee planners and layout crews who are designing cutblocks and roads?*

- ❑ Never
- ❑ Occasionally
- ❑ Often

Comments (e.g., what do you talk about?):

3. *Have you ever talked with planners and layout crews regarding your safety or the safety of your crew?*

- ❑ Never
- ❑ Occasionally
- ❑ Often
- ❑ Always

Comments (e.g., discussion format and place):

4. *Have you ever had a pre-job meeting with the government or licensee planners or layout crew prior to falling, yarding, loading and trucking operations?*

- ❑ Never
- ❑ Occasionally
- ❑ Often
- ❑ Always

Comments (e.g., what did you talk about?):

5. *Are there government rules that make logging unsafe or restrict your ability to work safely?*

- ❑ Yes
- ❑ No
- ❑ Not sure

If yes, please describe:

6. *Can you make changes to plans (e.g., boundaries, retention tree locations, etc.) if you encounter a safety risk?*

❑ Never ❑ Limited ❑ Moderate ❑ Full ❑ Don't know

Comments (e.g., type of changes):

7. *Can cutblock, road design or layout changes reduce safety hazards?*

❑ Never ❑ Occasionally ❑ Often ❑ Always

Comments (e.g., how would you improve?):

8. *Do the maps that you work with clearly identify safety hazards like unstable ground, danger trees, root rot areas, etc.?*

❑ Never ❑ Occasionally ❑ Often ❑ Always

9. *If you answered "never" or "occasionally" to question #8, how could the situation be improved? If you answered "often" or "always," please give an example.*

10. *Do you think the planners and layout crews understand and meet your operational requirements about cutblock boundaries, tree retention and road locations?*

❑ Never ❑ Occasionally ❑ Often ❑ Always

11. *If you answered "never" or "occasionally" to question #10, how could the situation be improved? If you answered "often" or "always," please give an example.*

12. *What changes would you make to the planning and design of cutblocks and roads to improve worker safety?*

13. *What is your understanding of government requirements for worker safety?*

❑ Limited ❑ Moderate ❑ Comprehensive

14. *Who do you think is responsible for worker safety? Please rate each group by responsibility from 0 (not responsible) to 5 (highly responsible).*

_____ Government	_____ Licensee Management	_____ Planner
_____ Logging Supervisor	_____ Contractor	_____ Worker
_____ WCB	_____ Union	_____ Other

Comments (e.g., who should be responsible?):

Do you have any additional comments or suggestions?

Safety Survey for Forest Operations Workers

Your Profile:

Please complete the following information to allow us to profile survey participants.

What is your occupation or title? _____

How many years have you worked in the forest industry? _____

How many years have you worked in your current position? _____

Do you work for a:

- ❑ licensee
- ❑ contractor
- ❑ sub-contractor
- ❑ owner-operator
- ❑ government agency
- ❑ BCTS
- ❑ other _____

What size of organization is this? (No. of employees)

- ❑ 1–5
- ❑ 6–20
- ❑ 21–50
- ❑ 51–100
- ❑ 100+ workers

Where do you work?

- ❑ Northern Interior
- ❑ Central Interior
- ❑ Southern Interior
- ❑ North/Central Coast
- ❑ South Coast
- ❑ Vancouver Island

Does your organization have an active safety committee? ❑ Yes ❑ No

Are you a member of the safety committee? ❑ Yes ❑ No

This survey is designed to be anonymous. However, we expect that further questions will arise. Would you allow us to contact you at a future date with some follow-up questions?

If yes, please complete the following:

Name: _____

Mailing address: _____

_____

Email: _____

Telephone: _____

Thank you again for contributing your knowledge and suggestions. The information gathered in this survey will improve forest worker safety in British Columbia.

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